



End-of-Course Assessment

February 2007

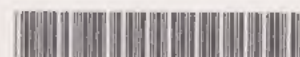
You must read through this entire booklet before starting work on your end-of-course assessment because it contains important information regarding the submission of your work.

ECA cut-off date:

Thursday 4 October 2007

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1 Introduction and cut-off date

S103 has an end-of-course assessment (ECA) instead of an examination. The aims of this assessment are to help you to consolidate your science skills and for the University to formally assess your learning and understanding of course concepts. **Even if you have fallen behind with your studies, you must do the ECA in order to complete the course.**

ECA cut-off date: Thursday 4 October 2007

Your ECA *must* reach Walton Hall by the above cut-off date. It consists of **two parts**; each part carries 50% of the marks for the assessment. To be sure of a pass in the ECA you need to achieve a score of 40% of the overall marks.

2 Advice on tackling your end-of-course assessment (ECA)

The ECA should be tackled in the same way as you have been advised to tackle your tutor-marked assignments (TMAs) throughout the course. However, we include some general advice here to remind you of the most important points to consider.

2.1 Presentation of your ECA

You can either hand-write your ECA or you can use a word-processor, whichever you find easier and more convenient. As long as your answers are clearly legible and well laid out you will get the same number of marks.

If you choose to word-process your answers you should bear the following points in mind.

- It is important that any numbers and units that you use in calculations, etc., are set out correctly as in the course materials. You should use correct scientific notation; subscripts, superscripts and symbols should be put in by hand if they cannot be printed correctly.
- Be particularly careful with the way in which you set out calculations, show equations and include diagrams. Even if you word-process the main text of your ECA, you may find it simpler to leave a gap so that you can write in calculations or equations by hand.

2.2 Answering the question

Open University tutors will always tell you that more marks are lost in assessments by students failing to answer the question in the way that is asked than for any other reason. Questions are carefully worded to elicit specific answers. You should not regard them as an opportunity to write down everything you know about a topic.

- Read the whole question carefully before starting to answer any part, and make sure that you understand what is being asked for.
- Check the meanings of any words that you are uncertain about by using the *S103 Course Glossary* or a dictionary.
- Pay particular attention to any words that have been *italicized* for emphasis.
- Follow the instructions. If you are asked for a table or diagram you will lose marks if you do not include one. If you are asked for four reasons, you will lose marks by giving three or five.
- Take careful note of words such as 'describe', 'explain', 'list', 'sketch' and 'briefly'. They are used for good reasons. When you come across terms like these, stop and think about what they mean.

- To decide how much detail you should include in an answer, look at the number of marks allocated. A short answer will obviously have fewer marks allocated than a detailed description or a complex calculation.
- Attempt all parts of a question, and make sure that your answers are clearly marked with the question number and the part. You should also number the pages of your work, e.g. 1 of 6, 2 of 6.
- Before posting your ECA, read through your answers carefully and check them against the questions to make sure that you have not missed anything.

2.3 Presenting answers to calculations

It is important to present your answer to a calculation in such a way that the person marking your work can understand fully how and why you arrived at your answer. Usually more marks will be awarded for the steps in a calculation than for the final answer. Showing all the steps in your working will help you, too; it will keep your thinking clear as you do the question and will make your answer easier to check when you have finished.

It is worth bearing in mind the following guidelines whenever you present an answer to a calculation.

- Set out your answer clearly with appropriate words of explanation – the answers to questions in the course materials provide a model to follow.
- Include all the steps in a calculation.
 - First, write down any equations you are using, and define the terms that you use in them.
 - Then write down the numerical values (with units) of the quantities in the equation.
 - Then write the equation with the numerical values and units in it.
 - Next, show any intermediate steps used in your calculation.
 - Write down the answer with the correct unit and the correct number of significant figures.
 - Finally, check your answer against what was asked in the question to see whether what you have put is sensible.
- Remember to use scientific notation and SI units where appropriate. Marks will be deducted if these are asked for and not used.

There is further guidance on expressing yourself mathematically in *The Sciences Good Study Guide*, p. 112.

2.4 Writing explanations and descriptions

In Part II of the ECA you are asked to write a long account and are told approximately how many words your account should be. You should use the number of words as a *guide* to the amount of information and type of answer required. If your answer is much shorter than the number of words indicated in the question, you have probably omitted some important information. If your answer greatly exceeds the suggested length, you may have included irrelevant information and your answer may lack clarity; you will be penalized for greatly exceeding the word limit.

Further guidance on writing assessments is given in *The Sciences Good Study Guide*, Chapter 9.

2.5 Planning a written answer

The first thing to do when tackling an assessment question that requires you to produce a piece of science writing is to follow the advice that we have already given, and in particular to read the question very carefully to make sure that you are clear about what you are being asked to do.

The next stage is to look back over all the *relevant* course material and to make very brief notes of any concepts, examples, etc. that you might include in your answer. You should not write down every detail at this stage, because you may decide later that some things are not appropriate to include. But don't forget to make a note of *where* you found each item of information (e.g. page number), as you might need to go back later to check on details.

You should then make a rough plan of your piece of writing. This needs to include *what* information you're likely to include, the *order* in which you intend to present the information, and the *point* that you intend to make with it. You can produce a plan that is a list of topics with an indication of the appropriate order, or you may prefer to produce your plan as a diagram of some sort. Remember that your plan is primarily for your own use and so it does not have to be well presented. You are likely to have second or even third thoughts as you plan your work, so your plan may have many crossings out. If you decide to change the order in which you present your points, you will probably have arrows to show this on your plan.

Further guidance on writing plans is given in *The Sciences Good Study Guide*, p. 254.

You will then be in a position to produce a first full draft of the actual piece of writing. If you find this hard, don't worry. Putting your thoughts about a difficult subject down in writing for others to read *is* a hard task. While it undoubtedly does get easier with practice, very few people can simply sit down and let the words flow effortlessly.

One thing to remember is that you are expected to produce a piece of *science* writing that shows that you understand the concepts. It is therefore important that you *use* and *spell* scientific terms correctly.

Finally, it is worth organizing your work schedule so that you can put your first draft aside for a few days before you produce the final version that you submit. Possible improvements will be far more obvious when you read the draft again with fresh eyes, and this will make it a lot easier to produce the final version.

2.6 Including diagrams

In your answer to Part II of the ECA, you do not have to include diagrams but you may choose to do so. When including diagrams you should follow the advice given below.

- Keep it simple and clear; think carefully about how much detail is required to illustrate your answer, and try to avoid things that are irrelevant.
- Use clean solid lines, even for sketches; it is better to use a *sharp* pencil than a pen, in case you want to make changes; use a ruler when drawing straight lines.
- Label the important features; it is often better to locate labels outside the area of the diagram and to use a straight line to connect the label to the feature to which it refers. If necessary, include a key to any colours used and a scale.
- Give your diagram a title or caption; when you use more than one diagram, number each of them so that you can refer to them easily (e.g. Figure 1, Figure 2).

- Make sure you refer to the diagram in the supporting text.
- A diagram should be your own work. You may *base* it on a diagram from the course materials, or other source, but it is unlikely to be suitable without modification. You must make sure, if you use a diagram from any source, that you reference the source of your diagram in your ECA answer.

2.7 Source materials for your ECA

All the information that you need to construct your answers may be found in the S103 course texts, particularly in Block 12. You may want to use other information that you find in books, journals or websites, but you are unlikely to score good marks by using lots of material from outside the course texts. You should bear this in mind, and not spend too much time researching on the Web when you could be revising the course texts. Remember that material you use from any source must be correctly referenced. You should note also that, even where you have referenced your work, you *must not* copy out statements, sentences or paragraphs word for word, as this constitutes plagiarism.

Further guidance on how to reference your sources is given in the Appendix to the *Study File for Block 2*.

3 Submitting your ECA

This part of the booklet explains the University's arrangements for submitting your ECA. Please read it carefully, as it contains important information that could affect your course result. Further details can be found in your *Assessment Handbook*.

You must send *three* identical copies of your ECA (including identical use of colour if appropriate) to Walton Hall to arrive by **Thursday 4 October 2007**. We recommend that you allow at least three working days for delivery. You should use A4 paper for your assessment, and include the page number, your name and your Personal Identifier on every page to guard against loss. All three copies of your ECA should be carefully and securely packaged, and sent (to arrive on or before the cut-off date) to:

Head of Assessment, Credit and Awards
Projects, Portfolios and Dissertations Office
The Open University
P.O. Box 721
Walton Hall
Milton Keynes
MK7 6ZU

You must send all three copies of your ECA together in the same envelope.

A pre-addressed label is enclosed for your use. Please mark the envelope with the course code.

You are strongly advised to obtain proof of postage and to keep a copy of your ECA in case your three submitted copies are lost in the post. Copies will not be returned to you.

You should **not** send copies of your ECA to your tutor. One copy will be sent to your tutor by the University for him or her to verify that this is your own work.

With your ECA you must submit the ET3 declaration forms. Attach one form to each copy of your ECA. The forms have been sent to you in the mailing that contained this booklet. *All three* declaration forms must be completed and signed

by you to show that the work on this assessment is your own. If you do not sign the forms, they will be returned to you for signing and this could delay your ECA being marked.

You should ensure that all three copies of your ECA are complete. Extra or missing pages or corrections received afterwards cannot be accepted and will be returned to you, even if received before the cut-off date.

The University will not accept faxed copies of your assessment, nor will it accept copies submitted in electronic format or by email.

Work may be delivered to your Regional Centre (excluding any non-UK office), and must be handed in at least two days before the cut-off date to ensure that it reaches the office in Milton Keynes on or before the cut-off date. If you have to deliver your ECA by hand, either at your Regional Centre or at Walton Hall, please ensure that you obtain a receipt that gives the name of the person you handed it to and the date on which it was handed in.

You are advised not to use recorded delivery post for sending your work as this delays its progress within the University and is relatively expensive. However, if you are sending work from outside the United Kingdom, you may find recorded delivery or a courier service the most appropriate method. Do remember, though, to check with the courier company that they can deliver to a P.O. Box number. If not, simply cross out the P.O. Box number on the address label.

Work received after 4 October 2007 will not normally be accepted for assessment and will be returned unmarked. The ECA constitutes the whole of the examinable component of S103, so if your work is returned to you unmarked, you will receive a 'Fail' result.

Your tutor is not authorized to give permission for you to submit after the cut-off date. Under very exceptional circumstances an extension may be possible, and details of the procedure for extensions are given in Section 3.4 of this booklet.

3.1 Checklist

Before you submit your ECA, you should ensure that you have done the following:

- checked that each page of your ECA has your personal identifier, a page number and the relevant question number
- made four identical copies (including identical use of colour if appropriate) of all the pages of your ECA: three for submission and one for your records
- checked that the pages are in the correct order, and are clipped or stapled together. Please do not use plastic files or plastic envelopes
- signed all three ET3 declaration forms, and attached one to the front of each copy of your ECA for submission
- completed, stamped and included the acknowledgement card with your ECA, if you wish (see Section 3.2)
- put sufficient postage on the envelope for it to arrive on or before the cut-off date. **A single first class stamp may not be sufficient, and work received late because of insufficient postage will be returned unmarked.**

Now send your envelope containing *all three* copies of your ECA to the address on p. 5 of this booklet, using the adhesive label provided. **Make sure that you obtain evidence of posting.**

3.2 Acknowledgement of receipt of your ECA

There is an acknowledgement postcard in the mailing with this booklet. If you would like acknowledgement of receipt of the copies of your work, you should complete, stamp and enclose the postcard with your ECA. The University will not return postcards without stamps to students living in the UK. If you live outside the UK, you are not required to attach postage stamps but should still write your address on the postcard.

If the postcard is not returned within a week (plus the time you estimate it will take in the mail) you should telephone the Projects, Portfolios and Dissertations Office on 01908 655291 or email:

projects-and-portfolios@open.ac.uk

You can also check that your ECA has been received by logging on to your OU home page (StudentHome).

3.3 Late submissions

If the ECA is received by The Open University after the cut-off date, the work will *not* be assessed unless:

- you are able to prove that it was posted in sufficient time to arrive before the cut-off date, or
- you have had formal approval for delay or deferral from the University, having followed the procedures set out in this booklet.

3.4 Extensions and deferrals of your ECA

In certain *exceptional* cases, where you cannot meet the cut-off date for your ECA because of circumstances beyond your control, you may be eligible to either:

- delay submission by up to three weeks (an 'extension'), or
- defer submission until the submission date on the following presentation of the course, in May 2008 (a 'deferral').

You can apply to delay or defer your submission **only** if the following circumstances have arisen in the final three weeks before the cut-off date:

- a prolonged illness – in this case, supporting medical documentation must be provided, or
- death or the serious illness of a close relative – a medical certificate or other appropriate supporting evidence must be provided, or
- other *serious exceptional circumstances* supported by documentary evidence.

You can get formal approval to submit your work late only by following the procedure below. No other area or employee of the University is authorized to give this permission.

If you wish to apply for an extension or a deferral, you must do so **in writing** – the University will not accept telephone requests – and your request **must be received before the cut-off date**. Neither your tutor nor staff at your Regional Centre have the authority to give you permission to submit after the cut-off date.

To do this you can either write a letter or complete an extension/deferral request form. The form is available from either the Learner Support Team at your Regional Centre, or from the Projects, Portfolios and Dissertations Office at Walton Hall (tel.: 01908 655291).

You should send your request to:

Assessment Policy Office
The Open University
P.O. Box 83
Walton Hall
Milton Keynes
MK7 6BF

Alternatively, you can send an email to:

eca-extension@open.ac.uk

Remember that *your request must be received before the cut-off date*. We strongly recommend that you obtain proof of posting in case your request is lost or delayed. Your request will be acknowledged to confirm its safe receipt.

Your application should clearly set out:

- your name, personal identifier and the course code (S103)
- the details of your circumstances
- the timescale in which they affected your work
- independent documentary evidence supporting your application; if you are ill, this must be a medical certificate that covers the period concerned and is signed by a certified medical practitioner.

If you require advice on the formulation of your application, please contact the Study Support Team at your Regional Centre. You should not assume that an extension or deferral will be granted. You are therefore advised to continue working on your ECA while a decision is pending. If permission is denied, you should submit whatever you have been able to complete by the deadline with two E39P forms giving details of the circumstances that have affected the preparation of your ECA. (Note: two E39P forms are printed on pp. 13 and 15 of this booklet.)

4 Special circumstances affecting your performance

The Examination and Assessment Board can give only limited weight to information about special circumstances. Nevertheless, if you believe that you have studied the course effectively but that special circumstances have had a *serious adverse effect* on your performance in your continuous assessment and/or in the three weeks leading up to the submission of your ECA, you may bring information about this to the attention of the Board. Your *Assessment Handbook* and the notes on the back of the E39P form (on pp. 14 and 16 of this booklet) give guidance as to the sort of circumstances that the University considers serious and those that it does not. Members of the Learner Support Team at your Regional Centre will also be able to offer advice.

The *Assessment Handbook* explains what you have to do in order to report special circumstances. Briefly, you must use Form PT39 and/or Form E39P, as described below.

Form PT39 – continuous assessment

The PT39 form is available from the Study Support Team at your Regional Centre and on the website at:

<http://www.open.ac.uk/assessment/pages/forms-used-in-assessment.php>

Once completed, the form must be sent to your Regional Centre, together with supporting documentary evidence, to arrive *no later than Thursday 18 October*

2007, which is 14 days after the published cut-off date for the ECA. Neither your tutor nor any other member of staff may submit this information on your behalf. Please read the instructions on the form and keep proof that you have posted it.

Form E39P – submission of ECA (and period leading up to submission)

You must send in *two* copies of Form E39P (provided on pp. 13 and 15 of this booklet or available from the website given above). Advice is given on the reverse of the forms on the types of circumstance that are considered to be serious. Since you are reporting circumstances that you feel have adversely affected your performance, you should not send the form in before you submit your ECA, but you must send it to arrive *no earlier* than the cut-off date and *no later* than **Thursday 11 October 2007**, seven days after the cut-off date for the ECA.

Please read carefully the instructions on the form about filling it in. You must attach supporting documentary evidence. If this evidence is not immediately available, please explain why and forward it to the University as soon as possible. Keep proof of posting and a copy of the completed form for your records. *Do not use form E39P to ask for an extension or a deferral.*

Special circumstances information received later than the seven-day deadline, given above, cannot usually be taken into account unless there is good evidence to show that you were unable to notify the University in time. It is your responsibility to make sure that special circumstances information reaches the University by the appropriate date.

5 If you have a disability, an illness or a medical condition that has seriously affected your assessment

You are strongly urged to submit form PT39 (as discussed above) if you think you have been at a serious disadvantage in your continuous assessment because of your disability. Similarly, you should submit Form E39P if you think that your disability has significantly affected the preparation or quality of your ECA.

Any information about your disability that you have given the University for other purposes will not be brought to the attention of the Examination and Assessment Board.

6 Misconduct

The University insists on a very high standard of conduct from students in submitting work for assessment. Any misconduct is regarded as a serious matter that may warrant disciplinary action. Examples of misconduct in the submission of examinable work include:

- attempting to influence a marker or another University official (for example, by including notes in your ECA that are, or could be construed to be, intended to influence the reader)
- plagiarism (see Section 7 below)
- collusion – excessive collaboration with others that results in the same (or very similar) text being reproduced in each collaborator's ECA.

You should be aware that the University reserves the right to check your examinable work for possible plagiarism or collusion.

7 What constitutes plagiarism or cheating?

The following information is extracted from the University's formal statement on plagiarism, which is quoted in your *Assessment Handbook*. References to 'assignments' should be taken to include any piece of work submitted for assessment, not just tutor-marked assignments.

If you submit an assignment that contains work that is not your own without indicating this to the marker (acknowledging your sources) you are committing 'plagiarism'. This might occur in an assignment when:

- using a choice phrase or sentence that you have come across
- copying word for word directly from a text
- paraphrasing the words from a text very closely
- using text downloaded from the internet
- borrowing statistics or assembled facts from another person or source
- copying or downloading figures, photographs, pictures or diagrams without acknowledging your sources
- copying from a fellow student's notes or essays, or
- copying from your own notes, on a text, tutorial, video or lecture, that contain direct quotations.

Plagiarism may occur inadvertently because of inexperience. So read carefully all the course-specific study advice that you receive in your mailings, especially statements concerning plagiarism and how to reference your sources.

Although you are encouraged to show the results of your reading by referring to and quoting from works on your subject, copying from such sources *without acknowledgement* is deemed to be plagiarism and will not be accepted by the University. You are encouraged to collaborate with others in studying, but submitted work copied from or written jointly with others is not acceptable, unless collaboration is required in the particular assignment. Therefore, you are asked to sign a statement to confirm that all the assessment work you submit is your own.

Submitting work that has been done by someone else and persistent borrowing of other people's work without citation are obvious instances of plagiarism and are regarded as cheating. Paying for work from other sources and submitting it as your own is also cheating. It is intellectually dishonest to cheat and thus give one student an unfair advantage over others. If a case of plagiarism is proven, this is a serious offence and the Open University disciplinary procedures will be followed, as described under the Student Regulations SA 1.6 and SD 7.2.

8 Course results

Course results will be sent out in late December. After they have been sent out by post, you will be able to find your result from your student record by clicking on the *Your course records* link on your OU home page (StudentHome) at:

<http://www.open.ac.uk/students>

To access your student record you will need an OU computer username and password. You can obtain them, if you have not already done so, by registering for the University's computer service from your OU home page (StudentHome). Use the *You can now register online* link and follow the instructions on the

screen. A username and password will then be sent to you by post. You are advised to do this *before* you send in your ECA.

For a full explanation of how course results are determined, and to answer any queries you may have regarding certification, please refer to the appropriate chapter(s) in your *Assessment Handbook* and Section 5 of the *S103 Course Guide*.

If you do not submit any of the ECA, you will be issued with a 'Fail' result and will not be entitled to resubmit, unless you have permission for a deferral.

If you marginally fail the ECA but have achieved an overall pass mark on continuous assessment, you are expected to do a new piece of examinable work. This will consist of the ECA from the next suitable presentation of S103. However, please note that University rules do not allow students to have more than one resubmission or deferral, so:

- If you marginally fail on a deferred or resubmitted ECA, you will not be entitled to resubmit.
- If you are registered to resubmit your ECA, you cannot defer your resubmission.

If you have not received your result by **mid-January 2008** please write to

Examinations Office
The Open University
P.O. Box 720
Walton Hall
Milton Keynes
MK7 6ZQ

Please do not ask your Regional Centre, tutor or Course Team members about your results. Information about results cannot be given over the telephone.

8.1 Pending results

For a few students each year, Examination and Assessment Boards are unable to come to a decision about the course result to be awarded. If this happens to you, you will be given a 'pending' result. There are various reasons for this. The Board may want you to attend a *viva voce* examination in person (e.g. if your tutor has not been able to verify that your ECA is your own work). You would be told about this separately. Alternatively, a TMA score or other information might be missing from your assessment record. Urgent action is always taken by the University to provide the Board with the information it needs so that a final result can be sent to you as soon as possible.

8.2 Course result queries and appeals

If you want to query your course result(s), you should write to:

Head of Examinations and Assessment
The Open University
P.O. Box 720
Walton Hall
Milton Keynes
MK7 6ZQ

You must do this within four weeks of your course result being issued. Before doing so, please read carefully the explanation in your *Assessment Handbook* of how course results are awarded, and the sections about result queries and formal appeals to the Pro Vice-Chancellor (Students). Note also that a course result can be reviewed only if there is evidence of a clerical, administrative or system error.

in determining that result. Students have no right of appeal against the academic judgement of an Examination and Assessment Board.

You should not await receipt of ECA feedback (see section 8.3 below) before raising a query if this is the action you feel is appropriate. The University will not engage in any discussions about feedback comments, and will not accept students' disagreements over particular comments as grounds for reviewing course results.

8.3 Feedback on performance

Your marked ECA will not be returned to you. However, you will receive feedback based on your performance in the ECA, and these will be accessed via your OU home page (StudentHome).

Throughout the course you have received detailed individual feedback from your tutor regarding your performance on your continuous assessment. The feedback you will get on your ECA will not be so detailed; however, it is important that you receive some indication of your performance, as you will find it useful as you progress to higher-level study, as well as simply being interested in where you did well and where you did not do so well!

For Part I of the ECA, you will be given an indication of your performance with respect to mathematical, data handling and graphical skills. There will be several components within each skill to consider (e.g. 'arithmetic skills', or 'rearranging equations') and you will be awarded a category for each, based on your performance (e.g. well-demonstrated, not quite demonstrated).

For Part II of the ECA, you will be given an indication of your performance with respect to your use of communication skills (e.g. the clarity of your writing and use of references) as well as the science content of your account.

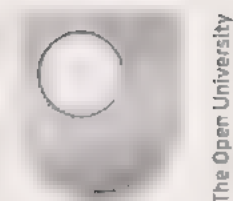
There will also be some more general comments on what were the most common pitfalls encountered by students when answering the ECA questions. These comments may or may not apply directly to you, but are included to give some indication of where you may have gone wrong if you find that some of your individual feedback (as described above) is not as generous as you anticipated.

8.4 Queries

If you have any queries about submitting your end of course assessment, please write to:

The Projects, Portfolios and Dissertations Office
The Open University
P.O. Box 721
Walton Hall
Milton Keynes
MK7 6ZU

Alternatively, you can telephone 01908 655291 or email:
projects-and-portfolios@open.ac.uk



The Open University

Form E39P

SPECIAL CIRCUMSTANCE INFORMATION (EXAMINABLE WORK)

- This form should only be used to inform the University of *serious* circumstances (see overleaf) that adversely affected the production of your final piece of work.
- **Do not** use this form to apply for a deferral or an extension to the submission date. Instead, please refer to **Section 3.4 Extensions and deferrals of your ECA** for details of how to do this or email ECA-Extension@open.ac.uk **Extension and deferral requests made on this form will not be accepted**
- Give *brief* and *precise* information on how your performance has been affected
- You **must** attach appropriate documentary evidence (see also note below*)
- Complete both copies of this form and send them to the Head of Assessment, Credit and Awards The Open University P O Box 720 Walton Hall Milton Keynes, MK7 6ZQ To help us deal with the forms quickly, please clearly mark the envelope 'E39P'.
- Enter details of *one course only* on this pair of forms. If you need more forms for other courses, please either ask your Regional Centre for extra ones or photocopy this form
- If you want receipt of this form to be acknowledged, please enclose a stamped self-addressed envelope
- You **must** retain proof of postage
- *The forms must arrive no later than seven days after the cut-off date for submission of your final piece of work. Forms that arrive later will not be accepted except at the University's discretion*

Name (block capitals)

Region
code

Cut-off date for submission of
examinable work

Personal identifier

Office use only

TYPE E

Course affected
(one course per form)

The serious special circumstances that adversely affected the preparation of my examinable work were

If necessary continue on a separate sheet

Type of documentary evidence attached*

* If this evidence is not immediately available, please explain why and forward it to the University no later than 4 weeks from your submission date.

I wish the above information to be made available to the Examination and Assessment Board

Signature

Date

GUIDELINES ON SUBMISSION OF SPECIAL CIRCUMSTANCES (E39P)

Read these notes before completing the form.

- 1 If you want to report special circumstances that have had a significant adverse effect on your performance in **continuous assessment** please **do not** complete this form use form PT39 instead which you can get from your Regional Centre.
- 2 Form E39P should be used only to report special circumstances that have adversely affected your performance in your final examinable work.
- 3 Use a separate pair of forms for each course for which you wish to report special circumstances You can get extra copies of the form from your Regional Centre Alternatively, you may photocopy this form.
- 4 The kinds of special circumstance that the University may consider to be serious include
 - The death or critical illness of a dependent or close relative (evidence such as a medical certificate or death certificate is required)
 - A severely debilitating illness during most of the period leading up to final submission (medical evidence is required)
- 5 Circumstances that are not considered so serious and for which you should not submit the E39P form include
 - Planned house removals
 - Pressure of work
 - Normal pregnancy
 - English as a second language
 - Failure of computer hardware or software
- 6 When you submit the form you must enclose corroborating documentary evidence Special circumstances not supported by documentary evidence will not be considered If your supporting documentation is not available immediately, please explain this on the form and send it on as soon as possible afterwards
- 7 If you have a disability or additional requirements that mean you are unable to complete the form yourself, it can be completed on your behalf However it remains your responsibility to ensure that the form and supporting documentary evidence is submitted within the appropriate timeframe
- 8 You can apply for an extension or deferral of examinable work by emailing the ECA Extension address overleaf

If you need advice about completing the form please ask your Regional Centre

Even when special circumstances have adversely affected your performance in your examinable work the weight that the Board can give to the special circumstances is limited The number of special circumstance cases submitted has greatly increased over recent years making the already demanding job of the Board even more difficult Cases that have little substance or that warrant little or no weight are unhelpful to you to other students who have suffered very severe circumstances and to the University Please consider very carefully whether your case merits attention before completing the form

The submission of late 'special circumstances' information for example after the release of course results will not be accepted except in exceptional circumstances and then only at the University's discretion

**SPECIAL CIRCUMSTANCE INFORMATION (EXAMINABLE WORK)**

- This form should only be used to inform the University of *serious* circumstances (see overleaf) that **adversely affected the production of your final piece of work**.
- **Do not** use this form to apply for a deferral or an extension to the submission date. Instead, please refer to **Section 3.4 Extensions and deferrals of your ECA** for details of how to do this or email ECA_Extension@open.ac.uk. ***Extension and deferral requests made on this form will not be accepted***
- Give *brief* and *precise* information on how your performance has been affected
- You **must** attach appropriate documentary evidence (see also note below*)
- Complete both copies of this form and send them to the Head of Assessment Credit and Awards, The Open University, P.O. Box 720, Walton Hall, Milton Keynes, MK7 6ZQ. To help us deal with the forms quickly, **please clearly mark the envelope 'E39P'**.
- Enter details of *one course only* on this pair of forms. If you need more forms for other courses, please either ask your Regional Centre for extra ones or photocopy this form.
- If you want receipt of this form to be acknowledged, please enclose a stamped self-addressed envelope.
- **You must retain proof of postage.**
- *The forms must arrive no later than seven days after the cut-off date for submission of your final piece of work. Forms that arrive later will not be accepted except at the University's discretion.*

Name (block capitals)

Region
code
Cut-off date for submission of
examinable work

Personal identifier

Course affected
(one course per form)

Office use only

TYPE E

The serious special circumstances that adversely affected the preparation of my examinable work were

If necessary continue on a separate sheet

Type of documentary evidence attached*

* If this evidence is not immediately available, please explain why and forward it to the University no later than **4 weeks from your submission date**

I wish the above information to be made available to the Examination and Assessment Board

Signature

Date

GUIDELINES ON SUBMISSION OF SPECIAL CIRCUMSTANCES (E39P)

Read these notes before completing the form.

- 1 If you want to report special circumstances that have had a significant adverse effect on your performance in **continuous assessment** please **do not** complete this form use form PT39 instead which you can get from your Regional Centre.
- 2 Form E39P should be used only to report special circumstances that have adversely affected your performance in your **final examinable work**
- 3 Use a separate pair of forms for each course for which you wish to report special circumstances You can get extra copies of the form from your Regional Centre Alternatively, you may photocopy this form
- 4 The kinds of special circumstance that the University may consider to be serious include
 - The death or critical illness of a dependent or close relative (evidence such as a medical certificate or death certificate is required).
 - A severely debilitating illness during most of the period leading up to final submission (medical evidence is required)
- 5 Circumstances that are not considered so serious and for which you should not submit the E39P form include
 - Planned house removals
 - Pressure of work
 - Normal pregnancy
 - English as a second language
 - Failure of computer hardware or software
- 6 When you submit the form you must enclose corroborating documentary evidence Special circumstances not supported by documentary evidence will not be considered If your supporting documentation is not available immediately please explain this on the form and send it on as soon as possible afterwards.
- 7 If you have a disability or additional requirements that mean you are unable to complete the form yourself it can be completed on your behalf However it remains your responsibility to ensure that the form and supporting documentary evidence is submitted within the appropriate timeframe
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The submission of late 'special circumstances' information for example after the release of course results, will not be accepted except in exceptional circumstances and then only at the University's discretion.

End-of-course assessment (ECA)

This end-of-course assessment (ECA) consists of two parts, each part carries 50% of the marks for the assessment. To be sure of a pass in the ECA you need to achieve a score of 40% of the overall marks.

Part I

Part I carries 50% of the marks for the ECA. It assesses the broad range of scientific skills you should have acquired during your study of S103, without necessarily drawing on specific material you have studied. You should answer all questions in Part I.

Note that when giving a final numerical answer you should give your answer to an appropriate number of significant figures (unless otherwise instructed). Remember to show your workings when answering the questions.

Question 1

This question is worth 26% of the marks for the ECA.

- (a) (11 marks) Methane, one of the minor constituents in the atmosphere, acts as a greenhouse gas like carbon dioxide. Figure 1 shows how the proportion of methane in the atmosphere, expressed in the unit parts per billion (p.p.b.), has changed over the past millennium. (Note that one billion is equivalent to a thousand million, i.e. 10^9 .)

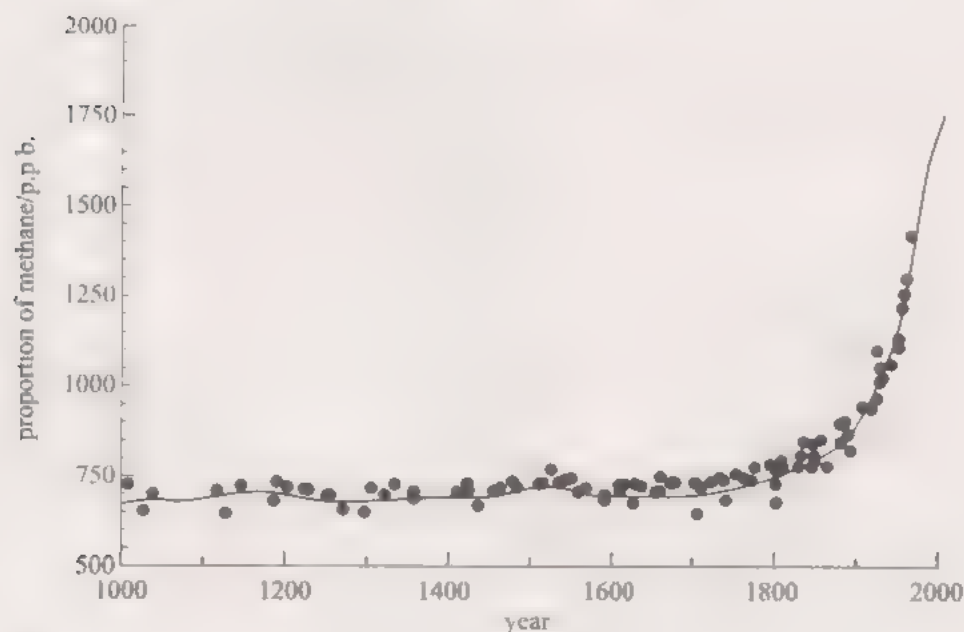


Figure 1 Proportion (in p.p.b.) of methane in the atmosphere over the past 1000 years, as indicated by analysis of air bubbles trapped in ice cores drilled in Antarctica (filled circles) and by direct atmospheric monitoring over the past few decades (included in the smoothed curve through the data).

- (i) Use the smoothed curve in Figure 1 to estimate the proportion of methane (in p.p.b.) in the atmosphere in each of the years 1000 and 2000.

- (ii) Express the proportions you estimated in part (i) as fractions and then as numbers in scientific notation. Show your reasoning. (Hint: see Box 6.3 on pp. 86–7 of Block 2.)
- (iii) Use your answers to part (i) to *calculate* the percentage change in the proportion of methane in the atmosphere between 1000 and 2000. Show your working
- (iv) *Describe* the overall trend of the data shown in Figure 1, and any features in the rate of increase in atmospheric methane that you notice.
- (b) (12 marks) The major natural sources of atmospheric methane can all be traced back to the breakdown of organic matter by bacteria that thrive in anaerobic (i.e. oxygen-free) environments – principally in waterlogged soils (bogs, swamps and marshes) and in the guts of grazing animals and termites. The increase in atmospheric methane over the past millennium has been attributed to human activities that effectively add a new source of the gas and/or increase natural emissions in various ways. Examples include: agricultural activities (rice paddies and grazing livestock such as cattle and sheep); waste management (e.g. organic matter rotting in landfill sites); and the extraction and distribution of fossil fuels (e.g. leakage from natural gas pipelines). Estimates of current annual emissions of methane from various natural and human-related sources are collected in Table 1. (Note: ‘t’ denotes tonnes, i.e. 10^3 kg, and ‘y’ denotes year.)

Table 1 Estimated annual emissions of methane to the atmosphere from various natural and human-related sources.

Source	Emissions/ 10^6 t y ⁻¹
Natural sources	
wetlands	118
termites	21
other	21
Human-related sources	
fossil-fuel related	102
rice paddies	59
grazing livestock	86
waste management	91
other	37

- (i) *Calculate* the total mass of methane emitted to the atmosphere each year, expressing your answer in kg y⁻¹ in scientific notation.
- (ii) If one mole of methane has a mass 16 g and one mole of carbon has a mass 12 g, *calculate* the mass of carbon in total annual emissions of methane to the atmosphere, expressing your answer in kg y⁻¹ in scientific notation. Show your working.
- (iii) Express the ratio of total annual emissions of methane from natural sources to total annual emissions from human-related sources in the form 1 : x. Show your working.
- (iv) *Calculate* the percentage of total annual emissions of methane that is due to agricultural activities (i.e. rice paddies and grazing livestock). Show your working.

- (c) (3 marks) Methane can be generated in the laboratory by adding water to solid aluminium carbide (Al_4C_3), the other product from the reaction being solid aluminium hydroxide, $\text{Al}(\text{OH})_3$. The equation below is an unbalanced form of the chemical equation for the reaction to produce methane. Write a balanced equation for this reaction using the lowest possible whole-number coefficients, and including the state of each compound. You may assume that the reaction occurs at room temperature.



Question 2

This question is worth 12% of the marks for the ECA.

A mutant house mouse was discovered in Germany and geneticists have identified a single gene that caused it to grow to a size much bigger than normal. The gene is known as 'obese'. Table 2 shows the average masses of a sample of the normal mouse population and a sample of the obese mutant mouse population from birth to 80 days.

Table 2 Masses of normal and obese mouse populations from birth to 80 days

Sample group	Average mouse mass/g							
	Day 0	Day 5	Day 10	Day 17	Day 20	Day 40	Day 60	Day 80
Normal mouse population	2.5	3	6	8.5	11	14	15	15
Obese mutant mouse population	2.5	3.5	6.5	9	12	16	24	30

- (a) (3 marks) In this question, you will be plotting both sets of data given in Table 2 on the graph paper provided on page 25 of this booklet. Draw your graphs by hand, remembering to include a title and to label the axes suitably. Firstly, plot the data for the normal mouse population. Secondly, on the same graph, plot the data for the obese mouse population, using a different symbol for the data points from the symbol that you used for your normal mouse data.

You may use your own graph paper if you prefer, but your graph must be plotted by hand. There are two spare copies of the graph paper on pp. 27 and 29 that you may use if you wish, rather than scanning or photocopying the original to produce copies of your graph.

If you cannot plot graphs by hand due to a disability, you should contact your tutor for advice.

- (b) (3 marks) On the graph that you plotted in part (a), draw a best fit line through the obese mouse data points for the first 80 days, and determine a value for the gradient of this line. Indicate on the graph how you obtained the value of this gradient. (Hint: see Box 10.1 on pp. 104–105 of Block 3.)
- (c) (4 marks) From your graph that you plotted in part (a), describe clearly the appearance of the 'normal mouse' data. Then, in two or three sentences, describe how the graph for the obese mice differs from the graph for the normal mice. (Note: when writing your descriptions, you should use language that would be understood by another S103 student.)

(d) (2 marks) Scientists subsequently analysed the mass of a population of 11 obese mice 30 days after birth. This information is presented in Table 3. Calculate the mean mass of these mice.

Table 3 Masses of eleven 30 day old obese mice (A–K).

Mouse	A	B	C	D	E	F	G	H	I	J	K
Mass /g	14.8	15.3	15.0	14.6	15.1	14.9	15.4	15.3	15.7	15.1	15.3

Question 3

This question is worth 12% of the marks for the ECA.

(a) (7 marks) Scientists investigating the strength of river floods came across an old newspaper photograph showing a person standing beside a large boulder that had been washed down a river bed by a flood. On the photograph, the person was 5.8 cm high, and the boulder was 3.8 cm across.

- Assuming that the person was 1.7 m tall, what was the actual width of the boulder?
- What is the mass of the boulder, assuming that it can be considered to be a sphere with a diameter given by your answer to part (i)? (Note: the formula for calculating the volume of a sphere is given by:

$$\text{volume} = \frac{4\pi r^3}{3}$$

Assume that the density of the boulder is 2700 kg m^{-3} , a value typical of rocks.)

(b) (5 marks)

- Re-arrange the following equation to make x the subject (i.e. $x = \dots$). Show your working.

$$c + ax^2 - 2by = 0$$

- In the equation $t = k\rho x d^2$ find the SI units of k , where

the SI unit of t is s

the SI unit of ρ is kg m^{-3}

the SI unit of x is m

the SI unit of d is m

k is a constant.

Show your working.

Part II

Part II carries 50% of the marks for the ECA. It assesses your skills of information retrieval and written communication within the context of Block 12.

Part II contains one question, which must be answered by all students.

Question 4

Europa is a satellite of Jupiter. Its outer surface is made of water ice, although its core is likely to be rocky. In the past few years many scientists have begun to suspect the presence of an ocean of liquid water below the icy surface of Europa. The discovery of abundant life around hydrothermal vents at the bottom of deep oceans on Earth has stimulated discussion as to whether or not it would be possible for life to evolve in a subsurface ocean on Europa. One of the challenges of any mission to Europa is how best to determine whether or not a subsurface ocean does exist. The two extracts that follow highlight this issue, and serve to 'set the scene' for the account that you will write.

Extract 1, comes from a report commissioned by the European Space Agency (ESA) to investigate a potential mission to Europa. It describes what measurements might be made by a probe dropped onto Europa's surface, and the main problems that have to be overcome for the probe to be successful. Extract 2 is a short extract from a paper presented at a conference, in which the authors present their ideas for a probe that can melt its way down through Europa's icy crust.

At various points information has been omitted (both for ease of reading and also because the information goes beyond the scope of S103). Where this is the case it is designated by an ellipsis (...). In addition, where words have been added by the course team to clarify the meaning of a particular phrase, the words are shown in square brackets ([]).

Extract 1

The probe would need to penetrate the icy surface of Europa to perform basic measurements of the ice crust with a very limited instrument suite. However, as Europa has no appreciable atmosphere, the probe will either need a propulsion system capable of decelerating it to a low impact velocity, or it will have to be able to withstand impact velocities in the order of 2 km s^{-1} . The chance of anything surviving impact at 2 km s^{-1} is practically zero: not even hardened military projectiles are generally expected to survive such impact velocities.

Having identified a potential design for the probe, the remaining question was whether useful, even important, science could be achieved using the system. One of the (if not the) key question(s) is whether there is liquid water beneath the ice crust. If only a semi-solid slush exists, the chances of life forms existing, no matter how basic, become much smaller. After consultation ... a seismometer or geophone [device that measures vibrations] was proposed as the main instrument for this study. This is designed to 'listen' to the surface of Europa at very low frequencies (0–100 Hz). Seismic/acoustic events caused by cracking in the ice (due to tidal forces exerted by Jupiter) or by random meteor impacts, can propagate for thousands of kilometres in ice and water. If there is an ice/water interface then there will be 'echoes' caused by partial reflection of the seismo-acoustic [sound] waves at these interfaces. These can be captured and de-convolved [examined] to show the layers, their depths and constitution. Such techniques are routinely used

terrestrially in fields such as oil prospecting and underwater warfare. To enhance the scientific package of the probe, other instruments were also proposed that would meet the mass, power and volume budgets [i.e. the maximum mass, power and space available to the instruments], including temperature sensors that could measure the thermal flow [transfer of heat] in the crust of Europa, accelerometers that could measure the deceleration and hence the surface hardness of the ice and strain gauges that could measure the deformation of the probe.

Atzei, A. and Falkner, P. (2005) *Study Overview of the Jovian Minisat Explorer*, ESA Technology Reference Study SCI-AP/2004/TN-085/AA, 37pp.

Extract 2

Missions to explore the surface and sub-surface of Europa can use a wide variety of schemes and technologies. These differ in their cost and scientific return, with fly-bys and orbiters being relatively achievable, but yielding no in-situ knowledge of the European subsurface. At the other extreme in terms of returned science and complexity, is a device that is capable of melting its way through the satellite's icy crust towards the putative [supposed] ocean of water. Obviously, information about the biological activity within or under the European ice crust can efficiently be gained only with such an in-situ probe. Traces of indigenous biological activity, such as intact bio-molecules, are unlikely to remain unaltered for long periods at the exposed surface of Europa. Similarly, the chemical make-up of the upper-layers of the ice are not expected to reflect accurately the composition of a sub-glacial ocean. Broadly speaking, the sensors of an in-situ probe should be capable of determining the chemical and isotopic composition of the surrounding ice, as well as its short-range structure.

Biele, J., Ulamec, S., Sheridan, S., Morse, A.D., Barber, S., Wright, I., Tüg, H. and Mock, T. (2002) 'Melting probes at Lake Vostok and Europa', *Proceedings of the Second European Workshop on Exo Astrobiology* ESA SP-518, pp. 253-260.

The account

Write an account of *approximately 1000 words* (up to 1100 words is acceptable, but you must not go over this limit) that discusses the following statement:

If an ocean exists below the icy surface of Europa, then life might be present within it.

In your account you *must*:

- consider the evidence for a subsurface ocean on Europa
- briefly compare the likely conditions in a European subsurface ocean with those at the bottom of the deep oceans on Earth
- describe what stages of chemical evolution must occur, and the chemical and physical factors these require, if life is to emerge in a European subsurface ocean
- discuss how it might be possible to explore directly a European subsurface ocean (in order to detect life, if present).

State the number of words you have used at the end of your account. (Note: any diagrams you include in your account, and referencing of your source materials at the end of your account, are not included in the word count.)

Advice for your account

Scientific content:

- You will be drawing on information from a variety of sources within the Block 12 articles and the *Study File for Block 12*. You may also, if you wish, take information from other parts of the course materials you have studied, where these are *relevant* to your answer.
- Although you may draw on sources outside the course material (including other articles, books and web pages) you should note that you will be able to achieve completely the outcomes that will be assessed without going outside the course material.

Written communication skills:

- You are *strongly recommended* to prepare a plan for your account before you begin writing it. You do *not* submit your plan with the ECA.
- You may feel that the use of diagrams and/or tables would enhance your account (and save you words), but they are NOT essential to achieve the outcomes on which you will be assessed. If you do decide to include diagrams in your account, you should follow the advice given on pp. 4–5 of this booklet.
- You should bear in mind the advice that you have been given about writing accounts in TMAs, Activity 13.4 in the *Study File for Block 9*, Activity 10.4 in the *Study File for Block 10*, Chapter 9 Sections 3–5 of *The Sciences Good Study Guide* and the advice on pp. 3–5 of this booklet.
- You should review any feedback that you have received from your tutor about writing skills.
- When writing your account you should have in mind a reader who has studied S103, *but not Block 12* of the course.
- If you do include material from outside the confines of the course you *must* fully reference your sources. Please bear in mind that the tutors primarily will be awarding marks on your use of the material from the course, and will not award marks for your use of unreferenced material from outside S103.
- When planning your answer you will find it useful to note the page numbers (from the course materials or other sources) of the relevant items of information you plan to use. This means that you will be able to refer back to them more easily when you begin to write your account and you will also be able to reference them accurately, using the method described in the Appendix to the *Study File for Block 2*.

Referencing your sources

You are expected to reference *in full* the sources that you use to prepare your answer, with references embedded in the text and linked to a reference list at the end of your account. (You were asked to do this in TMAs 07 and 08.)

Remember that *Stop Press 3* (and TMAs 07 and 08) explained how you could make multiple references to a single source.

You can use either the numbered-referenced system, or the ‘Bradshaw et al., 1998’ type of system, with an individual reference to each citation in the reference list.

Alternatively, you can cite the first reference made to the text with full details in the reference list, and then subsequently use a shortened version in the reference

list including the term 'op. cit.' (meaning work already cited) and the page number to which the reference relates. (For example: Bradshaw et al., op. cit., p. 70.)

Assessment of your account

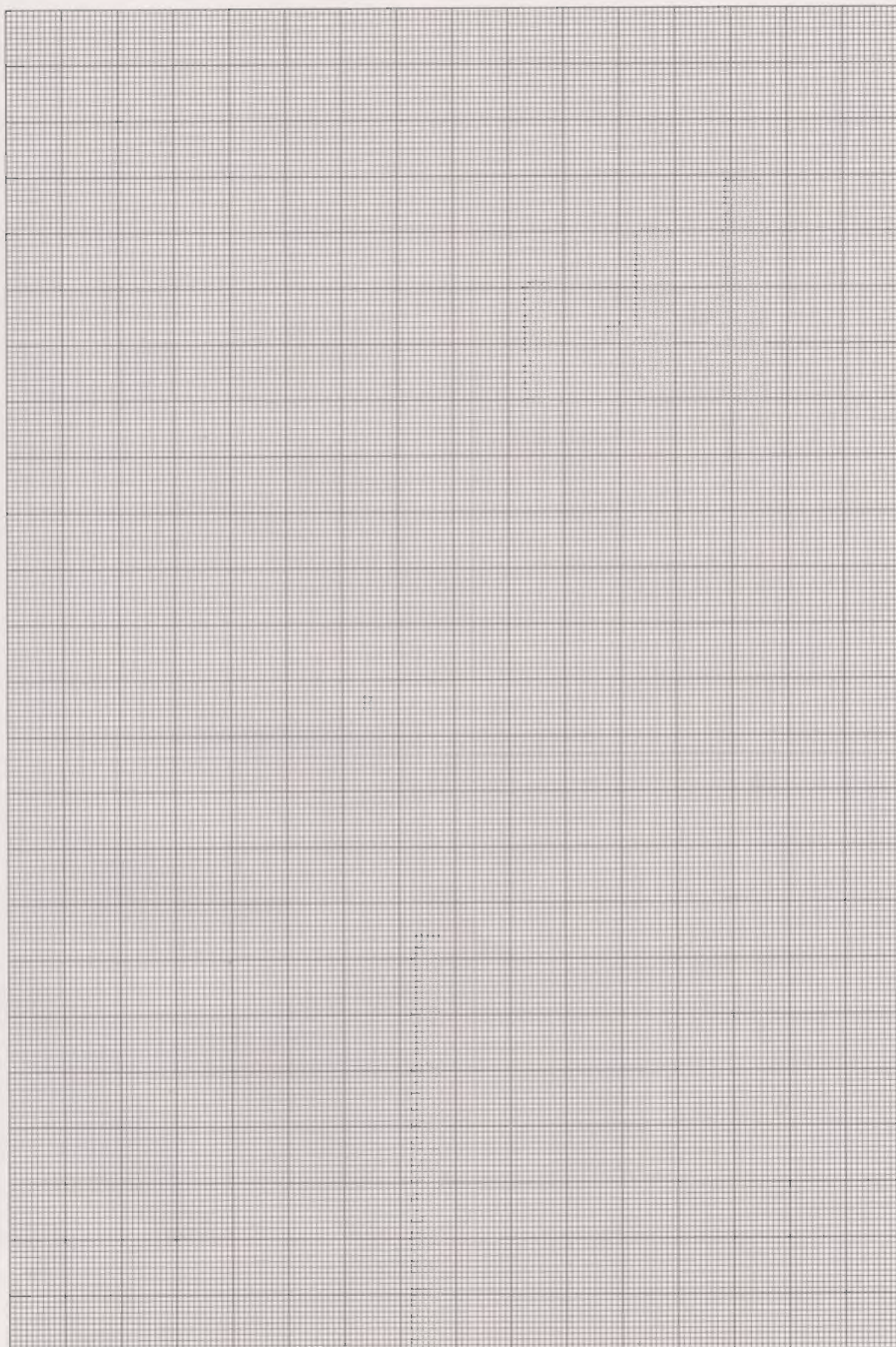
The science content of your account will be assessed with reference to five learning outcomes. The first four outcomes relate to the bullet points listed in 'The account' opposite. It is essential that you address each of these points to ensure that you *demonstrate your understanding* of the science content that you include in your account.

The fifth learning outcome assesses your ability to integrate relevant information from a number of sources and your ability to reference them correctly. When assessing your written communication skills the script marker will be looking for evidence that:

- your account has an *appropriate* introduction and conclusion
- your account has *coherence* (main topics are presented in a logical order and clearly linked to the themes in the question)
- your writing demonstrates *clarity* (its meaning is clear and it contains no ambiguities) and your use of English is correct (i.e. your account is divided appropriately into paragraphs and your spelling, punctuation, grammar and sentence construction are correct)
- your account is written concisely – it is within the word limit specified and does not contain material that is irrelevant to the theme(s) of the account
- you are able to write at a level suitable for your target audience, using scientific language correctly and using your own words
- you have referenced your source materials appropriately.

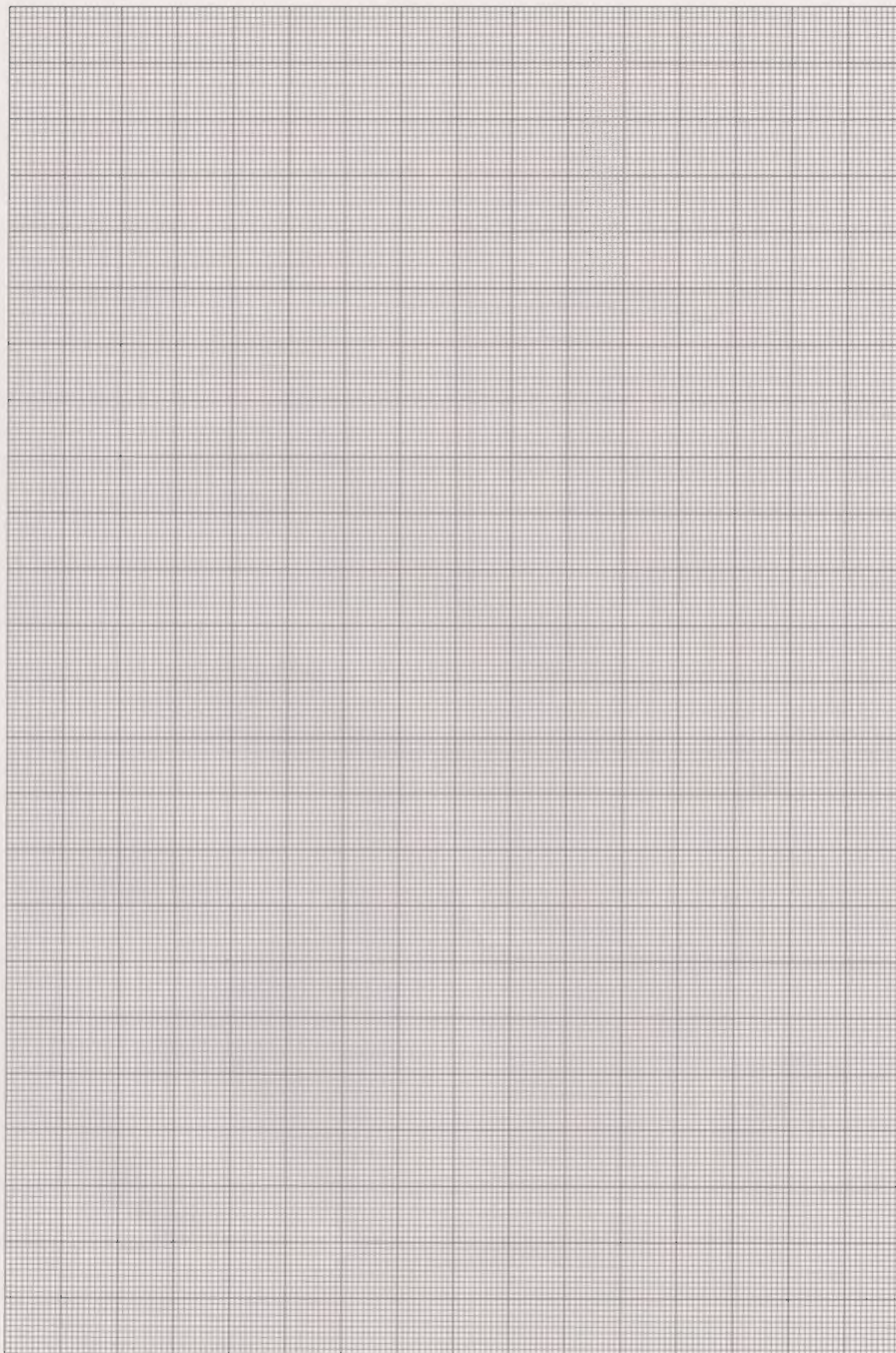
Approximately 60% of the marks for your account will be awarded for the scientific content and approximately 40% will be awarded for your written communication skills.





Spare graph paper for use with ECA Part I Question 2(a).

Personal Identifier							
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Spare graph paper for use with ECA Part I Question 2(a).

Personal Identifier								
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